

Optimization of Battery Operation Management Using Robust Design

Julian O. Blossi, Frank Deligiannis, Salvador DiStefano

*Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91109*

ABSTRACT

In recent years following several spacecraft battery anomalies, it was determined that managing the operational factors of NASA flight Ni Cd rechargeable battery was very important in order to maintain space flight battery nominal performance. The optimization of existing flight battery operational performance was viewed as something new for a Taguchi Methods application. Nevertheless, for this experiment, a modified 1,16 orthogonal array was selected with five operational factors at four levels. Each experiment run consisted of sixty charge-discharge cycling at the selected operational levels. The designed experiment of the 1,16 partial factorial performance lasted nine weeks. A full factorial would have lasted over eleven years. Also, the confirmation trial proved to indicate over 96% improvement of nominal battery performance as compared to the performance at the initial best-thought operational levels. The cost savings was estimated at over 400%, while experimentation time saving was estimated at over 300%.